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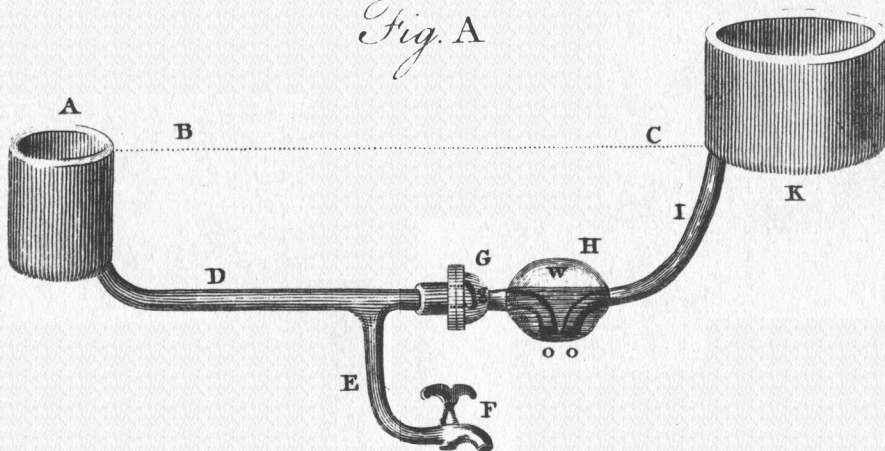
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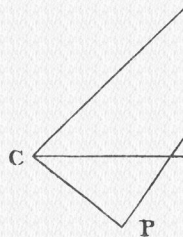
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*Fig. A*

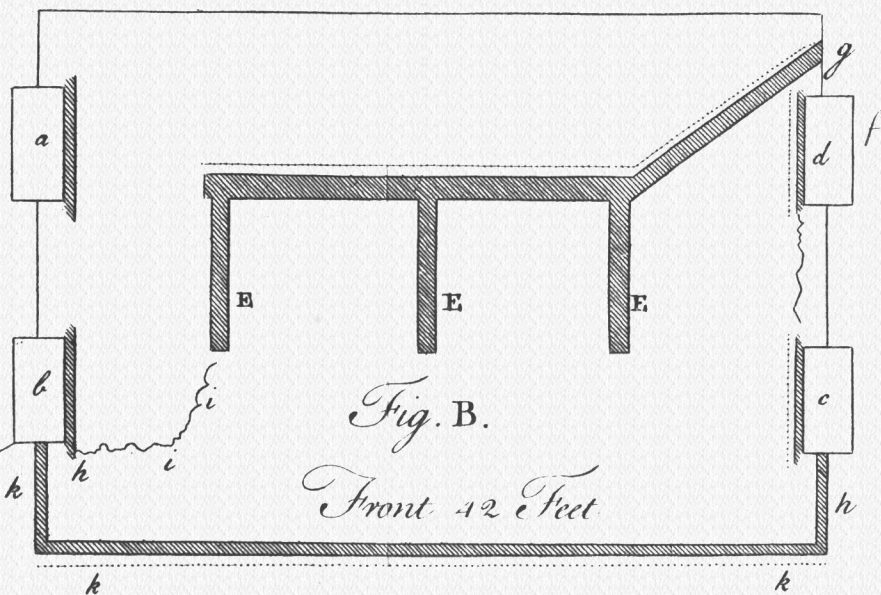


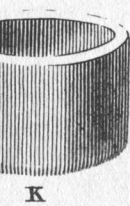
*Fig. 1.*



*Fig. B.*

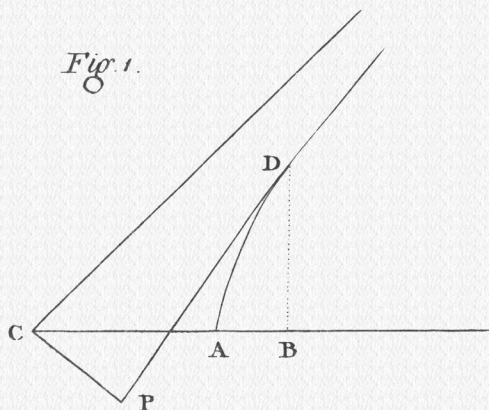
*Front 42 Feet*



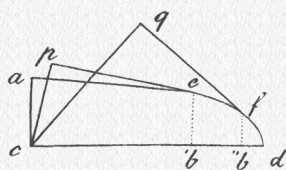
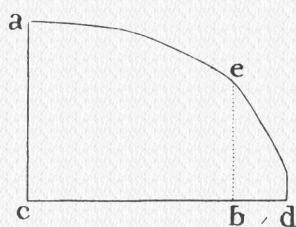


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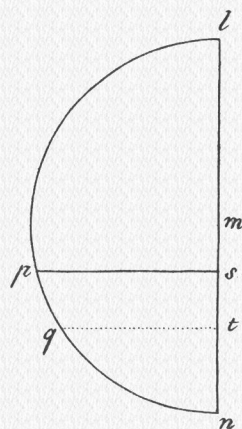
*Fig. 1.*



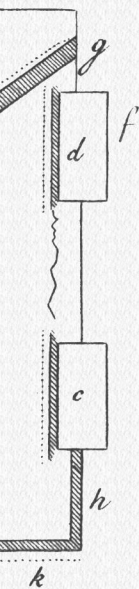
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



XXIV. *Account of a Machine for raising Water, executed at Oulton, in Cheshire, in 1772. In a Letter from Mr. John Whitehurst to Dr. Franklin.*

DEAR SIR,

Redde, Mar. 16,  
1775.

**P**RESUMING the mode of raising water by its *momentum* may be new and useful to many individuals, induces me to send you the inclosed plan and description of a work, executed in the year 1772, at Oulton, in Cheshire, the seat of PHILIP EGERTON, Esq. for the service of a brewhouse and other offices, and is found to answer effectually. I am, SIR,

Your most obedient servant,

JOHN WHITEHURST.

Please to observe, that the circumstances attending this water-work, require a particular attention, and are as follows (see TAB. VII. fig. A.): (A) represents the spring or original reservoir, whose upper surface coincides with the horizontal line BC, and the bottom of the reservoir K. D the main pipe,  $1\frac{1}{2}$  inch diameter, and nearly two hundred yards in length. E a branch pipe, of the former dimensions,

menfions, for the fervice of the kitchen offices. Now it is to be obferved, that the kitchen offices are fituated at leaft eighteen or twenty feet below the furface of the refer-voir A, and that the cock F is about fixteen feet below it. G represents a valve-box, *g* the valve, H an air-veffel, *oo* the ends of the main-pipe inferted into H, and bending downwards, to prevent the air from being driven out when the water is forced into it, *w* the furface of the water. Now it is well known, that water difcharged from an aperture, under a preffure of fixteen feet perpendicular height, moves at the rate of thirty-two feet in a fecond of time; therefore fuch will be the velocity of the water from the cock F. And although the aperture of the cock F is not equal to the diameter of the pipe D, yet the velocity of the water contained in it will be very confiderable: confequently, when a column of water, two hundred yards in length, is thus put into motion, and fuddenly ftopped by the cock F, its momentous force will open the valve *g*, and condense the air in H, as often as water is drawn from F. In what degree the air is thus condensed, is needlefs to fay in the inftance before us; therefore I fhall only obferve, that it was fufficiently condensed to force out the water into the refervoir K, and even to burft the veffel H, in a few months after it was firft conftituted, though apparently very firm, being made of fheet lead, about nine or ten pounds weight to a fquare foot. From whence it feems reasonable to infer, that the momentous force is much  
superior

superior to the simple pressure of the column IK; and therefore equal to a greater resistance (if required) than a pressure of four or five feet, perpendicular height. It seems necessary further to observe, that the consumption of water in the kitchen offices is very considerable; that is, that water is frequently drawing from morning till night all the days of the year.